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SYSTEM AND METHOD FOR THE CONTROL AND DISTRIBUTION CONTENT FOR TELEVISION DISPLAY

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SYSTEM AND METHOD FOR THE CONTROL AND DISTRIBUTION CONTENT FOR TELEVISION DISPLAY

BACKGROUND

The present invention relates generally to the field of electronics and in particular to a system and method for selecting and controlling the distribution of content for display on a plurality of televisions.

The modern television does far more than its original function of displaying broadcast television shows. While the television still performs that function, it additionally displays a wide variety of other content, including prerecorded audio/video content. The television provides a user interface for interactive services, such as accessing the World Wide Web. The provision of the varied content displayed on a television is often controlled and coordinated by an external unit having a variety of content source inputs, ubiquitously referred to as a "set-top box."

The ability of a television to display a variety of types of content has been exploited by the lodging and hospital industries. For example, a television in a hotel room, in addition to providing traditional broadcast and prerecorded audio/video content, may additionally offer interactive content, allowing a guest to view and order from a room service menu, or approve his or her bill for expedited checkout.

Hospitals additionally exploit the ability of a television to provide a variety of content. A television in a hospital room, in addition to displaying broadcast and prerecorded audio/video content, may additionally provide educational material, such as reviewing common medical procedures and providing care instructions. A hospital may also provide Internet access via a television and appropriate input devices, such as a

wireless keyboard with integrated mouse and a wired keyboard with an integrated mouse.

In a hospital setting, however, it is often not feasible or desirable to actually locate the "set-top box" on top of the television set. Hospitals typically impose stringent requirements on electrical, electromagnetic, and physical characteristics of any device to be located in a hospital room. For example, the device must typically be electrically isolated from medical devices and other electronics in the room, and emit no or extremely limited electromagnetic interference. In addition, sanitation restrictions may dictate a particular housing that is amenable to disinfection. These restrictions increase the cost of each "set-top box." Additionally, the distribution of wires and cables carrying the various content sources to each set-top box represents an unwieldy and inefficient approach to content distribution, as well as introducing additional electrical isolation complications. On the other hand, locating the "set-top box" remotely from the television presents significant problems of control, as users typically select content by directing input devices, such as wired and wireless remote control, directly at an input port of the "set-top box," which requires the "set-top box" be co-located with the television.

SUMMARY

The present invention relates to a method of controlling the content displayed on a television. A user provides control inputs to the television. A controller located remotely from the television generates content in response to the control inputs, and the television displays the content. The control inputs and content are communicated between the television and the controller via a bi-directional communications channel. In particular, control inputs from the television and content from the controller are converted to communications signals according to a protocol associated with the bi-directional

communications channel, and are then transmitted on the channel and converted back to an appropriate format at the controller and television, respectively.

In another aspect, the present invention relates to a method of distributing content to a plurality of televisions under control local to each television. A corresponding plurality of controllers is centrally located, remotely from the televisions. Each television receives control inputs, and transmits them to each corresponding controller across a bi-directional communications channel. Each controller generates content in response to the corresponding control inputs, and transmits the content to each corresponding television, which displays the content.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a functional block diagram of a television content control and distribution system according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 depicts a television content distribution system, indicated generally by the numeral 10, according to one embodiment of the present invention. The television content distribution system 10, particularly suited for use in a hospital, comprises a plurality of televisions 12 (only one depicted in Figure 1), each connected to a controller 14 via a bi-directional communication channel, indicated generally by the numeral 16. The controller 14 provides content to be displayed on the television 12, under the control of control inputs to the television 12 by a user. The control inputs and the content are communicated between the television 12 and the controller 14 by the bi-directional communication channel 16.

The television 12 includes a wired interface module 20 that receives control inputs from a wired device, such as a pillow speaker 22. The pillow speaker 22, a unit

that may include an audio speaker, a nurse call button, channel and volume controls for the television 12 and optionally other audio/video devices such as a radio (not shown), and other television content selection and control buttons, is typically located on or near a hospital bed, and connects to the television 12 through the bed or a console adjacent to the bed. The pillow speaker also may contain an accessory jack 23 that provides DC power and receives data input from external accessory devices such as for example a wired keyboard 25 or game controller 27. The television 12 additionally includes a wireless interface unit 24, which may receive wireless control inputs from a remote control 26, wireless keyboard 34, or the like. While the wireless interface unit 24 may receive and decode UHF or other RF electromagnetic signals, modulated ultrasonic signals, and the like as known in the art, the interface is typically infrared optical, and complies with the RC-5 codes for infrared communications. The infrared communication typically comprises an 880 nm wavelength infrared signal, modulated at 36 KHz.

The television 12 is preferably one specifically designed for hospital use, such as the Phillips Hospital Grade Institutional Television, which includes a Smart Port 32. Smart Port 32 is an external interface, which "passes through" all detected and demodulated wired and wireless inputs from interfaces 20, 24, including those that are not recognized and acted on by the television 12. Thus, in a sense, the television 12, and particularly the Smart Port 32, acts as a universal receiver/decoder for wired and wireless control inputs that are compatible with interfaces 20, 24.

The television 12 includes a tuner 28 operative to "tune in" one channel from among a plurality of channels input to the television 12 by a cable 29. While the tuner normally directly selects a channel based on input from the wired or wireless control input interfaces 20, 24, according to one embodiment of the present invention, the selection of a channel is based on input from the Smart Port 32 (received from controller 14 via bidirectional communications channel 16). The selected channel is output from

the tuner 28 to the display unit 30, for display to the user. As used herein, the display unit 30 includes both a monitor generating visual display, and one or more speakers generating audio output. Alternatively, the display unit 30 may receive audio/video content directly from the Smart Port 32 (generated by the controller 14 and transmitted to the television 12 via the bidirectional communication channel 16).

The bidirectional communication channel 16 comprises a television-side interface unit 36, a communication bus 38, and a controller-side interface unit 40. In one embodiment, the communications bus 38 comprises a serial bus, and preferably comprises a differentially driven serial bus such as the Electronics Industry Association Recommended Standard EIA/RS-422. An RS-422 bus may, for example, be implemented using CAT 5 cable, including four twisted-pair conductors, with RS-422 protocol-compliant driver/receivers in the interface units 36 and 40. The bi-directional communications channel 16 may alternatively be implemented with serial protocols such as EIA/RS-232, EIA/RS-432 or EIA/RS-485. Those of skill in the art will readily recognize that the bidirectional communications channel 16 may be implemented according to a wide variety of industry standard protocols, or alternatively, by any number of custom solutions. Regardless of the communications protocol utilized, those of skill in the art will recognize that either or both of the television-side interface unit 36 and controller-side interface unit 40 may be implemented as stand-alone devices, as depicted in Fig. 1, or alternatively may be incorporated into the television 12 and/or controller 40, respectively.

The bi-directional communications channel 16, and in particular the interfaces 36 and 40, provide the proper physical, electrical, and logical interfaces to the Smart Port 32 interface of the television 12, and the data interface of controller 14, respectively. Additionally, the bi-directional communications channel 16 is preferably powered from the controller 14, and electrically isolated from the television 12, such as via optical

coupling isolation devices, as well known in the art. This is to ensure compliance with strict hospital regulations regarding electrical and electromagnetic interference, ground loops, and the like.

The controller 14 is a device operative to provide a broad array of audio/video and interactive content, under the control of control inputs from the television 12. The controller 14 is known in the art as a "set-top box" and may for example comprise the Activity 300 unit available from Fujitsu/Siemens, and/or BCM Model STB1100. Contrary to the term of art "set-top box," according to the present invention, the controller 14 is located remotely from the television 12. Preferably, the controller 14 is co-located with a plurality of other controllers 50, 52, such as rack-mounted in an equipment room. This arrangement presents several advantages over co-locating each controller 14, 50, 52 with its associated television 12. The equipment room housing the controllers 14, 50, 52 may be more consistently environmentally controlled than individual hospital rooms, resulting in increased reliability and more consistent operation. By removing the controllers 14, 50, 52 from the hospital room, the controllers 14, 50, 52 need not be certified as to the strict physical, electrical, and sanitation requirements of equipment located in patient rooms. Additionally, different content source inputs may be more easily provided to the entire array of controllers 14, 50, 52.

A central server 46 retrieves audio/video and interactive content from a variety of sources, including a video server 42 and computer network such as the Internet 44. The video server 42 may store and provide premium audio/video content, such as movies, recorded concerts, and the like. The video server 42 may additionally store and provide customized audio/video content, such as medical documentaries, educational programs, hospital introduction and orientation programs, emergency evacuation instructions, and the like. The server 46 may also retrieve a broad variety of audio/video and interactive content from the Internet 44, such as the World Wide Web. The content retrieved from

the server 46 is distributed to and among the controllers 14, 50, 52 via router 48. The retrieval of content by the server 46, and the distribution by the router 48 occur under the control of control inputs sent by the television 12 across the bi-directional communications interface 16 to the controller 14. Similarly, the content retrieved by the server 46 is transmitted by the controller 14 across the bi-directional communication channel 16 to the associated television 12.

Figure 1 additionally depicts a cable head end 54, distributing cable television to each controller 14, 50, 52, which in turn distributes the cable to the associated television 12, for example, via coax cable 29. The controller 14 may select which channel distributed via the cable is to be displayed by sending commands to the tuner 28 (transmitted to the Smart Port 32 of the television 12 via the bidirectional communications channel 16). On the other hand, the controller 14 does directly provide audio/video and interactive content other than that available on the cable 29 to the display 30 of the television 12 (by transmitting it to the Smart Port 32 via the bidirectional communications channel 16).

In practice, the user may control the content displayed on the television 12 in a variety of ways. When the television 12 is initially powered on, a main menu is preferably displayed to the user. In one embodiment, the main menu comprises four options – watching television, accessing the Internet, accessing hospital services, and accessing educational services – each represented by an icon located in a quadrant of the displayed menu. The user may directly access one of the options by pressing the associated key on the pillow speaker 22. Alternatively, the user may select one of the options (the selection being indicated by an outline, highlight, reverse video, or other indicator applied to the associated icon, as well-known in the art) by scrolling through the options using the directional keys on the pillow speaker 22, the remote control 26, or other input device. When the desired content option is selected, the user may access

the associated content by pressing the ENTER key on the pillow speaker 22, a corresponding key on the remote control 26, or the like. Each service selected may optionally bring up similar menu pages, for selecting from among specific content offered as part of the associated service. Preferably, navigation among the sub-menus mirrors that utilized on the main menu.

The display of menu and sub-menu pages, including feedback such as the currently selected menu option, are generated by the controller 14 and transmitted via coax cable 29 to the display 30 of the television 12. User input, including the direct service access keys, directional keys, and the ENTER key, are transmitted through the Smart Port 32 and across the bi-directional communications channel 16 to the controller 14, to control the interactive process. Similarly, additional user inputs, such as for example, inputs from a wireless keyboard 34 and/or wired keyboard 25 via the pillow speaker 22 when the user is accessing Internet content, are transmitted to the controller 14 along the same route, and control the interactive session. Due to the "pass-through" provision of the Smart Port 32, a wide variety of devices to generate control inputs may be utilized with the present invention.

Although the present invention has been described herein with respect to particular features, aspects and embodiments thereof, it will be apparent that numerous variations, modifications, and other embodiments are possible within the broad scope of the present invention, and accordingly, all variations, modifications and embodiments are to be regarded as being within the scope of the invention. The present embodiments are therefore to be construed in all aspects as illustrative and not restrictive and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.